



MINERALS AND ENERGY DIVISION
DEPARTMENT OF NATURAL RESOURCES
AND ENERGY
NEW BRUNSWICK

Open File Report 88-9

PROCESS STUDIES GROUP
QUARTERLY PROGRESS REPORT:
"PROJECT OVERVIEW FOR FISCAL YEAR 1987-88"

by

J. Dean Thibault



Canada-
New Brunswick
Mineral
Development
Agreement

Entente Canada-
Nouveau-Brunswick
L'Exploitation
Minérale



Natural Resources and Energy
New Brunswick

Ressources Naturelles et Énergie
Nouveau-Brunswick



Energy, Mines and
Resources Canada

Énergie, Mines et
Ressources Canada

Price \$.85

This report has been prepared by:

Minerals and Energy Division
Department of Natural Resources and Energy
New Brunswick

Hon. Morris Green, Minister

1988

PROGRESS STUDIES GROUP
QUARTERLY PROGRESS REPORT:
"PROJECT OVERVIEW FOR FISCAL YEAR 1987-88"

The Mineral Investment Stimulation Program and Mineral Processing Investigations Program were funded under the Canada - New Brunswick Mineral Development Agreement, a subsidiary agreement under the Economic and Regional Development Agreement.

Copies available by contacting:

Minerals and Energy Division
Department of Natural Resources
and Energy
P.O. Box 6000, Fredericton
New Brunswick E3B 5H1

Report No.: Open File Report
38-9

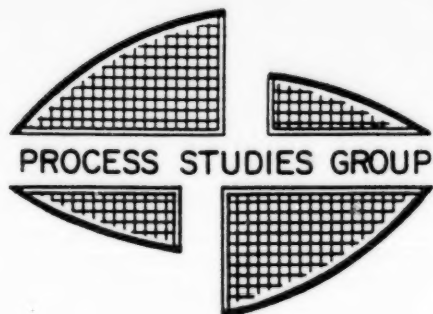
Author: J. Dean Thibault

Catalogue No.: ISSN 0712-4562

1988

This report should be referenced in the following manner:

THIBAUT, J.D. 1988. Process Studies Group quarterly progress report: "Project Overview for Fiscal Year 1987-88." New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File Report 88-9, 11 p.



QUARTERLY PROGRESS REPORT:

"Project Overview for Fiscal Year 1987-88"

MINERAL DEVELOPMENT

NATURAL RESOURCES AND ENERGY

THREE MONTHS ENDED

JUNE 30, 1987

1-878-1

CONTENTS

MINERAL PROCESSING INVESTIGATIONS PROGRAM (MPIP)	page 3
MINERAL INVESTMENT STIMULATION PROGRAM (MISP)	page 6
APPENDIX I PROJECT SCHEDULE FOR MPIP PROJECTS	

PROCESS STUDIES GROUP

PROCESS ENGINEER	DEAN THIBAUT
PROJECT ENGINEER*	ROBERT HARRIS
METALLURGICAL ENGINEERING TECHNICIAN*	BRENT BLIZZARD
CHEMICAL ENGINEERING TECHNICIAN*	GEORGE SPROUL
METALLURGICAL ENGINEER**	DON TAYLOR
SUMMER STUDENT**	AMYL GHANEM

ESTABLISHED 1986

The objective of interim reports is to provide project status on mineral processing studies being administered by Mineral Development and to assure a coordination of development among industry, government, universities, research and development.

*NOTE: MPIP and MISP are funded by the Federal Government under the Mineral Development Agreement.

**PART TIME ASSISTANCE

The overall goal of the Process Studies Group is to evaluate emerging technologies and processes, to liaise with industry and to recommend to the Province various ways in which research and development can be of assistance to the Mineral industry of New Brunswick. Various projects carried out under the Mineral Processing Investigations Program have led to further development by industry under the Mineral Investment Stimulation Program. As a result of the studies being carried out by both programs, various concepts have been identified for the development of New Brunswick mineral resources, which provide some basis for a centralized theme for an industrial development strategy. The following concepts have been recognized as areas which will diversify the mineral industry (as a mandate for the Mineral Development Agreement) and will be studied by the Process Studies Group for the Fiscal Year 87-88.

- A. High growth metals such as titanium, zirconium, gallium, and rare earths have been identified as metals where North American sources are highly dependant on imported ores or concentrates. A North American source of these metals is of great interest to most refining operations where refineries have a mandate to procure the cheapest raw material source. The potential for New Brunswick to produce concentrates of these high growth metals is to be reviewed. A flowsheet for the production of magnesium from dolomite will also be reviewed.
- B. The price of tungsten and the oversupply of concentrates have resulted in the closure of Mt. Pleasant. In the event of a strengthening tungsten market, a lower manufacturing

cost will be required for New Brunswick to remain competitive. Processing limitations and low cost processing alternatives are to be identified for the North Fire Tower Zone of Mt. Pleasant.

- C. Various refractory gold ores (limited extraction of gold, by leaching) have been identified from previous studies done on the leachability of gold from various ores of New Brunswick. Development of these ores has been limited because of high cost extraction methods and of environmental problems associated with arsenic. A study is to be carried out on the various technologies to overcome these problems, which will be used to characterize provincial ores.
- D. A major drawback to previous metal extraction in New Brunswick is the control of cyanide levels in the processing effluents. A review of cyanide removal technology will be carried out to identify a direction for further development.
- E. Bulk sulfide flotation has been identified as a major area for development in the upgrading of complex sulfide ores with respect to add-on processing methods for refining concentrates and to improving recoveries of conventional

selective flotation circuits. Lab and in-plant studies will be carried out to characterize various sulfide deposits of New Brunswick and to identify the commercial potential of new technologies for bulk sulfide concentration.

F. Flash flotation and column flotation are fairly new technologies to overcome loss of material by overgrinding and are used to improve on grade of concentrate. These flotation concepts are to be reviewed to identify the commercial potential of improving on metal recoveries of provincial concentrators.

G. Chloride hydrometallurgy has been identified from previous studies as a possible technology to produce antimony products from antimony sulfide concentrates. Further investigations will be carried out on this technology to identify the economic potential of a commercially producing antimony oxide.

MINERAL PROCESSING INVESTIGATIONS PROGRAM (MPIP)

The overall project schedule for MPIP projects has been outlined in Appendix I, where work in the first quarter, has been centered around the tungsten and speciality metal projects. For the first quarter, 21% of the budget for this fiscal year has been committed.

Process Development of Mount Pleasant Ores (Fire Tower Zone)

The economic potential of the various "valued" components of the North Fire Tower Zone was reviewed. It was determined that bismuth, fluorite, bulk sulfide and cassiterite could be exploited in addition to wolframite and molybdenite based on the revenue of various concentrates. The revenue from the sale of wolframite equates to a value of \$14.10 (U.S.) per tonne of ore (based on 1986 market prices) which is about 36% of the total revenue from all of the indicated minerals. The concentration of wolframite in the ore material and its current market price makes it the most valuable component of the North Fire Tower Zone deposit.

The add-on value of processing the various concentrates that could be conceptually recovered from Mt. Pleasant ore was reviewed based on 1986 market prices. Cost analysis indicates that the two most probable refining routes may be the production of arsenic metal or oxide and ammonium paratungstate.

A preliminary study of mineral concentrates and add on processing indicates that the extraction potential for fluorite, arsenic and various sulfides will be reviewed as by-products of tungsten production. As part of the flowsheet development, the potential for a gravity circuit and the add-on production of ammonium paratungstate will be studied.

Initial studies carried out to date indicate that the gravity separation of tungsten is superior to flotation, where the grind required for a gravity circuit is similar to that of flotation.

Processing of Speciality Metals--Phase II

A preliminary analysis of metals in the Woodstock manganese ore has indicated that manganese is a major revenue generator; however, additional revenue may be significant from germanium, gallium, titanium and aluminum. Major revenue metals from the Woodstock ores are considered strategic and scarce. In addition to the Woodstock manganese ore, coal ash and the iron ore-titanium deposit of Albert County contain significant quantities of Ge, Ga, Ti, Mn, Cd, U, Th, and Zr.

Of these most probable ores containing speciality metals (such as Ti, Ga, Ge), physical separation and enrichment of the minerals have not been effective. A fair amount of research has been done in the United States on chemical processing of coal ash and has been successful to produce enriched percentages of Al, Fe, Ti, Ge, and Ga. The major drawback to multi-element production is that the economics of the process is based on all of these metals and that co-production is not very attractive to refiners, where a guaranteed supply of feedstock is very important.

Chemical processing methods have been studied on Woodstock Manganese ores, where poor extractions of Ga, Al, Ti, and Ge (averaging 7-37%) have been identified with caustic and sulfuric acid leaching. Development of the Woodstock ore has been aimed at dump leaching using sulfurous acid. An agitated leach done at optimum conditions for the extraction of manganese around 83%, indicated limited extraction of Ti (1%), Al (11%), Ge (0%), and gallium (30%). Further work will be carried out to identify hydrochemical processing alternatives for commercial ventures.

MINERAL INVESTMENT STIMULATION PROGRAM (MISP)

As expected through discussions held in the previous quarter, the level of participation in the MISP rose moderately over this quarter, with the submission of three new applications by industry. The total sought commitment for these projects is \$134,000, which, if approved, would bring the overall committed monies for projects to \$286,368.

Two of the applications, which were recommended for approval by the sub-committee, were from new applicants representing the grass-roots developers of New Brunswick; namely, Mispec Resources Inc. of Saint John, and Maritime Resource Research Ltd. of Fredericton. The third application, which has been approved, is another project proposed by Brunswick Mining and Smelting. This brings the total number of approved projects undertaken by BM&S to five, reflecting a MISP commitment of \$151,575. Below is a status of the applications received this quarter:

<u>Applicant</u>	<u>Project</u>	<u>MISP Funding</u>	<u>Status</u>
Mispec Resources Inc.	Further characterization of a gold deposit at Cape Spencer by diamond core drilling.	50K	Sub- committee Approval granted
Maritime Resource Research Ltd.	Further characterization of a Manganese deposit near Woodstock by trenching and diamond core drilling	50K	Sub- committee Approval granted
Brunswick Mining and Smelting	The application of column flotation as a way of improving the grade of zinc concentrates	34K	Approved by Management Committee
	TOTAL	134K	

An evaluation format has been drawn up for MISP projects and it was based on the "Evaluation Framework" document produced for the current Mineral Development Agreement. This format will be applied firstly to the completed Durham projects entitled "Antimony Float Study" (8603-21G14) and "Antimony Smelting" (8604-21G14) and will likely be included in the monthly report for August this year.

MINERAL PROCESSING INVESTIGATION PROGRAM (Federal Monies)

FINANCIAL REPORT (First Quarter 87-88)

	<u>Budget</u> <u>March 31/88</u>	<u>Committed</u> <u>June 30/88</u>	<u>Balance To</u> <u>June 30/87</u>
Program Administration	\$ 60,000	\$ 14,710.54	\$45,289.46
Benef. of Complex Sulfides	10,000	2,720.83	7,279.17
Process Dev. Of Mt. Pleasant	15,000	1,520.08	13,479.32
Processing of Sp. Metals	<u>15,000</u>	<u>2,743.54</u>	<u>12,256.46</u>
Cash Position	100,000	21,695.59	78,304.41

MINERAL INVESTMENT STIMULATION PROGRAM (Federal Monies)

FINANCIAL REPORT (First Quarter 87-88)

	<u>Project</u> <u>Budget</u>	<u>Budget To</u> <u>March 31/88</u>	<u>Committed</u> <u>June 30/87</u>	<u>Balance To</u> <u>June 30/87</u>
Program ADM. (Year 2)	45,000	45,000	10,878.21	34,121.79
BMS-liberation	35,000			
BMS-metal dist.	21,000			
BMS-Pyrite float	11,795			
BMS-Press. Filter	14,508			
Durham-flash float	11,620			
BMS-column float	10,200			
Maritime R.R.-Woodstock Mn.	50,000			
MISPEC-Cape Spencer Au	<u>50,000</u>			
Cash Position	249,123	400,000	10,878.21	389,121.79

APPENDIX I PROJECT SCHEDULE FOR MPIP PROJECTS
FISCAL YEAR 87-88

PROCESS STUDIES GROUP-PROJECT SUMMARY SHEET

Revision (0): Mar. 16, 1987

10

Project Identification	Accounting Number	Project Description	Project Expenditure Budget (F-Federal) (P-Provincial)	Consignee	Initiation Date	Completion Date
A	H-76812	Optimization of Grade and Recovery at Durham Antimony Mine	F-25,000	Durham Resources	July 86	June 87
B	H-76811	Further Processing of Antimony Concentrates	F- 9,500	Durham Resources	Aug 86	Mar 87
C	H-76813	Leachability of New Brunswick Gold Ores	F-19,000	Gordex MacNamara Lacana Durham	Dec 86	June 87
D	H-76814	Extraction Possibilities of Speciality Metals Phase I	F-17,500	Province	Dec 86	Jan 88
E	H-76815	Beneficiation of Complex Sulfide Ores for Add-On Processing	F-18,000	Province	Dec 86	June 88
F	H-76816	Process Development of Mount Pleasant Ores (Fire Tower Zone)	F-15,000	Lac Minerals Billiton	Apr 87	Mar 88
G	H-34214	Flash Flotation Concept	P- 500	Province	Apr 87	Sept 87
H	H-34214	Column Flotation Concept	P-1000	Province	Apr 87	June 87
I	H-76817	Processing of Speciality Metals-Phase II	F-15,000	Province	Apr 87	Jan 88
J	H-34214	Ferric Chloride Leach-Hydrolysis Process	P-1000	Province	Oct 87	Mar 88
K	H-34214	Treatment of Refractory Gold Ores	P- 500	Province	Oct 87	Mar 88

